SYNOPSIS

"THE SYNTHESIS AND CHARACTERISATION OF METAL ION COMPLEXES AND THEIR BIOLOGICAL IMPORTANCE"

SYNOPSIS SUBMITTED TO

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Submitted by

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THE SYNTHESIS AND CHARACTERISATION OF METAL ION COMPLEXES AND THEIR BIOLOGICAL IMPORTANCE

Introduction:

Coordination chemistry is the most amazing field of modern inorganic chemistry. It includes the study of complexity of compounds. The complex compounds are mostly formed by ‘d’ and ‘f’ block elements and very few non-transition elements. The study of such compounds has challenged both the synthetic and theoretical capabilities. The new experimental techniques and new theoretical concepts have been originated to a profuse extent from research activities in this field. The complex compounds consist of a metal atom with certain number of ligands. Ligands are Lewis bases-they contain at least one pair of electrons to donate to metal atom. Metals are Lewis acids-they can accept pair of electrons. Ligands donate electron pair to metal atoms which posses vacant ‘d’ orbital’s.

Complex compounds are widely distributed in minerals, plants and animals and are known to play many important biological functions. For example, photosynthesis in plants involves chlorophyll, which is a complex compound of magnesium. The red pigment hemoglobin present in blood, which is responsible for the regulation of respiration process, is a complex compound of iron. A variety of metallurgical processes, catalyst and analytical reagents make use of complex compounds. Therefore, the study of complex compounds is highly significant from biological, industrial and analytical points of view.

Objectives of Research:

Research survey indicates that the organic compounds containing nitrogen, sulphur, oxygen donor atoms have tendency to form complexes with metal ion.

The study of metal ion complexes has a lot of applications in different areas. Applications of complexes changes with change in type of ligands. It is also affected by donor groups of ligands. Another most important factor of complex is metal atom, Metal atom have different functions. Oxidation state of metal atom affects the function of complexes. Recent research focuses on the organic ligands, the development of new ligand is very important step in the development of metal complex. They have unique properties and novel reactivities. Here we are trying to prepare such new complex compounds by using newly synthesized heterocyclic compounds as the ligand. So that the newly synthesize complexes will be useful for the medical and biological field, also it will be great benefit for society.

Review of Literature:

References indicate that, Thiosemicarbazone [1,2] have activity against small pox ,virus diseases & tuberculosis. Coumarin[3] & their derivatives acts as anticoagulant ,antiproliferative, antitumor ,antioxidant. Benzothiazole[4,5] compounds found to have extensive applications in medicinal field. It is used as antimaleria, antitumor, anti HIV, antiviral, fungicide & analgesic. It also has industrial applications in textile dying, processing of rubber etc.

Considerable attention has been focused on synthesis of new transition metal complexes of Schiff bases[6,7]. Ligands with bulky and aromatic groups are used to developed easy preparations and diversity structure. Schiff bases derived from amino and carbonyl compounds. Schiff bases have wide applications in food industry, dye industry, analytical chemistry, catalysis, fungicidal, agrochemical and biological activities. Pyridyl tetrazole[8] derivatives have been under investigation as a part of inorganic chemistry. Complexes containing pyrazoles[8,9] rings particularly tetrazoles have many significance, also they have many practical applications. Pyrazine[10] rings are present in number of naturally occurring compound. It is part of numerous drugs.

Methodology:

The proposed research "The synthesis and characterization of Transition metal ion complexes and their biological importance" includes preparation of metal ion complexes using newly synthesized chelating agent. These newly synthesized metal complexes were characterized by elemental analysis, Infra red, NMR, ESR spectra, magnetic susceptibility, conductivity and X-ray diffraction study .Biological activity of complexes were also be carried out.

Present research includes

1) The synthesis of Schiff bases.
2) Synthesis of metal ion complexes.
3) Elemental analysis of newly synthesize metal ion complexes.
4) Spectral study including IR, NMR, ESR.
5) X-ray crystallographic study.
6) Physical properties like colour, decomposition point.
7) Biological activity, metal ligand ratio, solubility.

Importance of Study:

<u>Significance:</u>

The study will help in medicinal as well as biological field ,as different complexes containing organic ligands is useful in food industries to protect food from enzymatic reactions. Complexes with chelating ligand is useful in cosmetic ingredient for skin care. It is useful in preparation of creams and lotions .Wide range of application of these complexes is in pharmaceutical industries to synthesize different types of drugs.

National Status:

Complexes with organic ligands have been studied from various researchers from India. The review of literature provides an update on recent advances in development and implementation of metal organic complexes[12]Sunita Bhanuka and Har Lal Singh. Only a limited work had been done in the experimental determination of ESR peak[13] M.L.Sahagal, Amit Aggarwal,K.N. kaul

International status:

Shows important milestone in the development of metal –heterocyclic ligand complexes for their medical and biological benefits[14]. In recent year much efforts has been put in synthesis and characterization in mono and binuclear metal complexes[15]. It is useful to study the relation between structures and magnetic change interactions.

Proposed Work Plan / Formulation and Structure of Study:

Year wise plan of work and targets to be achieved

Work and targets to be achieve	**Months**					
	0-06	07-12	13-18	19-24	25-30	31-36
Collection of references						
Collection of chemicals						
Preparation of ligands						
Preparation of metal complexes						
Characterization of complexes (IR,NMR,ESR and many more)						

References:

1) Antony E. Liberta and Douglas X. Rapid Communication Of Oxford Ltd.1992.

2) J. D. Patel Rasayan Journal of chem.. Synthesis characterization and chelating properties of 4 –formylsemicarbazone 2010.

3) P.K.Jain and Himanshu Joshi Journal of applied Pharmaceutical Science 2012.

4) Narendra pal, Renu Upadhyay ,pankaj K. Panday Chem. Tech, Biological importance of Zn(II) and Hg(II)Ternary complexes derived from 2-substituted Benzothiazole and amino acid 2017.

5) D.K.swamy ,S.P. Pachaling, T.M. Bhagat, Rasayan J. chem. B.synthesis ,charecterisation, antibacterial ,and antifungal studies on metal complexes with benzothiazolyl hydrazone 2012.

6) Anant Prakash, Devjani Adhikari ,2011 application of Schiff bases and their metal complexes.2011.

7) S.Rahim , A.antony, G.lukose, K.mohanan, Hubert Joe, R.S.Josephus .Oriental J. of chem. 2015 .

8) B.Umamaheswara Rao , V.krishna ,G. Nageswara Rao. Asian J. of chem. synthesis and antimicrobial activity of pyridyl tetrazole derivatives 2015.

9) Vivek Kumar ,Pathak ,P.R .Pandey Rasayan J. chem. Studies of some novel complexes containing nitrogen, sulphur donar atoms 2012.

10) S. Martin,C Revathi, A. Dayalan, N. Mathivnan and V.Shanmugaiya Rasayan J.chem. Halocarbloxime containing coordinated pyrazine carboxylic and carboxylic acid and carboxamide. 2008

11) K.P.Srivastava, Ali Akbar . Rasayan J. chem.89-96 2013.

12) Sunita bhanuka and Har Lal Singh.Rasayan J.chem.2016.

13) M.L. sahagal,Amit Aggarwal , K.N.Kaul and M.D.Irshad Ahmad.Oriental Journal of Chemistry 2017.

14)KHLOOD SAAD ABOU-MELHA Oriental Journal Of Chemistry 2015.

15)Voguri Harnath Babu ,K . venketeswara Rao , Podisetty Hemamalini , Badde Shrinivas andMore Ashok International Journal Of Chem Tech Research 2017.

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Research Guide

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